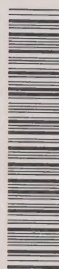


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The North Pickering Project

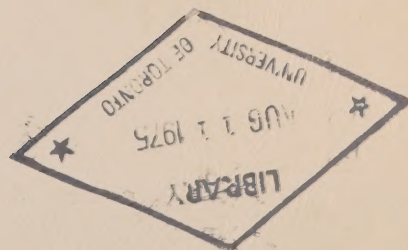
**Input/Output Study
for
Industrial Linkage Requirements**
(Background Paper No. 11)

January, 1975



Ontario

Ministry of
Housing




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CONTENTS

ABSTRACT: *socio-economic factors*
conceptual framework

INTRODUCTION: THE INPUT/OUTPUT METHOD

1. DIRECT AND INDIRECT EFFECTS:
 - 1.1 METHOD
 - 1.2 TOTAL EFFECTS
 - 1.3 TREATMENT OF HOUSEHOLDS
 - 1.4 INCOME AND EMPLOYMENT MULTIPLIERS
2. PROBABLE SECTORS ANALYSIS:
 - 2.1 SECTORAL LINKAGES
 - 2.2 FORWARD LINKAGES
 - 2.3 BACKWARD LINKAGES
 - 2.4 COEFFICIENT OF VARIATION INDEX
 - 2.5 KEY SECTORS
 - 2.6 IMPLICATIONS
 - 2.7 ECONOMIC IMPACT
3. THE CLUSTER THEORY
 - 3.1 CORRELATION IN GROUPS
 - 3.2 HIGHER LEVELS OF AGGREGATION
 - 3.3 CLUSTERS AND WAGES
4. SUMMARY AND CONCLUDING REMARKS
 - 4.1 METAL WORKING AND MACHINERY INDUSTRIES
 - 4.2 ELECTRICAL-ELECTRONICS INDUSTRIES
 - 4.3 FOOD INDUSTRIES
 - 4.4 CHEMICAL INDUSTRIES
 - 4.5 FURNITURE, FURNISHINGS AND PAPER PRODUCTS
 - 4.6 PRINTING AND PUBLISHING
5. SUMMARY TABLE A1
 - 5.1 Explanation of Table A1
6. CASE NO. 1: MISCELLANEOUS MANUFACTURING INDUSTRIES
7. SOURCES OF INFORMATION & BIBLIOGRAPHY

INPUT-OUTPUT STUDY FOR

INDUSTRIAL LINKAGE REQUIREMENTS

Abstract

This paper is an attempt to check on linkage requirements of industries initially identified as probable for North Pickering, thus providing another angle of approach for selection of the most probable industries of the new town.

The conceptual framework is the North Pickering Planning Area, Central Ontario and Province of Ontario in ascending order. There are many practical problems involved in input-output analysis. A major one is the need to adopt a sensible industrial classification and appropriate level of aggregation.

Secondly, the input-output model can be quite far from the reality it purports to replicate, because of some of the simplifying assumptions that must be used to make the device operational.

Thirdly, the time lag involved in compiling the data for any sizeable input-output model is quite large. This study deals with the most recent (1972) I/O table available for Ontario, which uses the 1965 manufacturing data.

In this study, Ontario's economy is divided into 49 sectors: 42 manufacturing sectors plus agriculture, forestry and fishing; construction, maintenance and repairs; transportation, storage and trade; utilities; communications and other services; and unallocated sector.

This division, adopted from the major source for this study, (reference (1)) does not use the Standard Industrial Classification (SIC) designations, but seems to describe the provincial economy fairly adequately.

NOTE: In order to avoid confusion and also to introduce an element of change when reading the text, the terms "industry" and "sector" are defined as equivalent and interchangeable. The same holds true for terms "effect" and "impact".

INTRODUCTION

It is now generally recognized that each economic system has a complicated internal structure that determines its performance. One of the ways of describing the internal economic framework is a technique known as "input/output" (I/O) method, introduced and developed by Wassily Leontief (4):

"The input-output method is an adaptation of the neo-classical theory of general equilibrium to the empirical study of the quantitative interdependence between inter-related economic activities.

The interdependence between individual sectors of the given system is described by a set of linear equations; its specific structural characteristics are thus reflected in the numerical magnitude of the coefficients of these equations."

These coefficients must be determined empirically; they are usually derived from a so-called statistical I/O table.

For a dynamic system, the linear equations become differential linear equations.

The basic tool of this method of analysis is an "inter-industry" table which consists of a set of linear formulae connecting the levels of activity of the various sectors of the economy.

Each sector is considered to buy its inputs from other sectors and to sell its outputs to other sectors.

For the purpose of determining the probable industries for North Pickering, the I/O analysis has been used to determine the following:

- 1) the nature and extent of indirect and induced links among the various sectors of the economy
- 2) the various primary and induced income and employment multipliers of each sector
- 3) the different types of production sectors classified according to their input uses and output distribution
- 4) the nature and extent of backward linkages among sectors
- 5) the nature and extent of forward linkages among sectors
- 6) the identification of "key" sectors in Ontario's economy
- 7) the construction of an overall index of performance

• DIRECT AND INDIRECT EFFECTS

The technical I/O matrix reveals the direct connection of an industry with others. However, an industry may directly sell to or buy from only a few industries, but its customers may be connected with many industries. (See figure 1). Therefore, it is essential to consider all direct and indirect relations that a given industry has with all other industries as given by the inverse matrix.¹

¹ See bibliography.

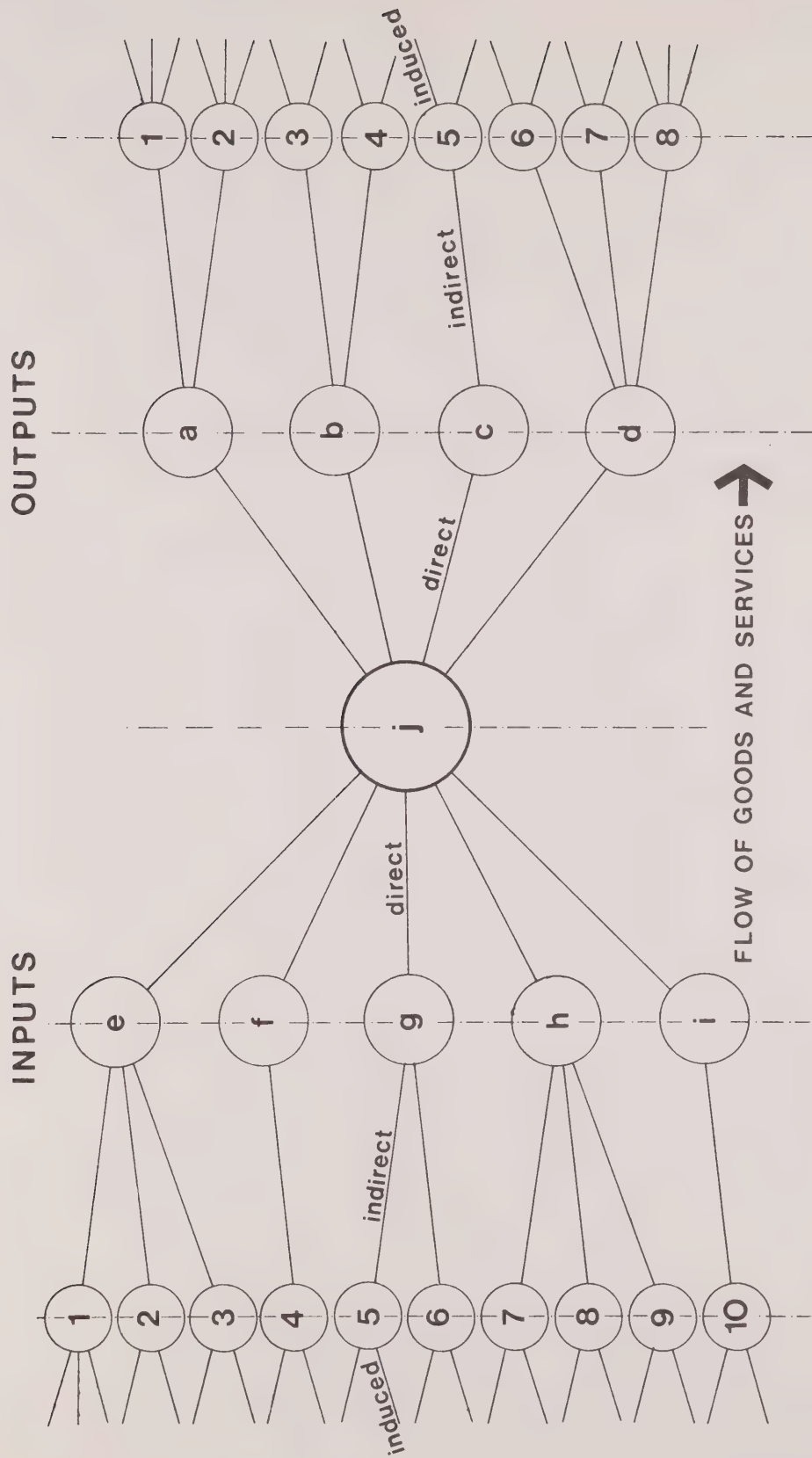


FIG. 1 DIRECT, INDIRECT AND INDUCED EFFECTS FOR INDUSTRY (j)

1.1 METHOD

The I/O matrix works as follows:

To account for how one unit of input is reflected in final demand, consideration must be given to: a) the direct input required to produce this unit of final demand, b) the first round indirect inputs required to produce the direct input, c) the second round indirect inputs required to produce the first round indirect inputs, and so on ad infinitum.

1.2 TOTAL EFFECTS

The total output effect of a dollar increase in final demand in sector j takes into account not only the repercussions of the initial change in the final demand for that sector, but also the repercussions in other sectors, namely the additional income generated in the process of producing an extra dollar of output j which is bound to induce more consumption and consequently more production.

It should be noted that in examining the total output effects of each industry it has been found that the indirect effects have the largest relative value. The induced effects are the smallest, and in most cases almost negligible.

The only exception is the communications and other services sector which exhibits very small value for direct effects while indirect and induced effects are relatively large.

TABLE 1

The 20 industries with largest total output effects per dollar increase of final demand of that industry in the order of magnitude are:⁽¹⁾

- | | |
|--------------------------------|-------------------------------|
| 1. Plastics & synthetics | 11. Paint and varnish |
| 2. Meat & poultry | 12. Miscellaneous manufacture |
| 3. Other food industries | 13. Rubber products |
| 4. Dairy products | 14. Other chemical industries |
| 5. Grain mills | 15. Knitting mills |
| 6. Petroleum & coal products | 16. Paper products |
| 7. Leather | 17. Other electrical products |
| 8. Motor vehicle & aircraft | 18. Biscuits & bakeries |
| 9. Cotton yard & cloth | 19. Sugar & confections |
| 10. Tobacco & tobacco products | 20. Other primary metals |

1.3 TREATMENT OF HOUSEHOLDS

To evaluate the overall output effect (direct plus indirect plus induced) within the I/O framework consumption must be related to value added in such a way that consumption may be considered as the "input" necessary to produce the "output" of income. In other words, households must be treated as a production sector in the matrix of inter-industry flow of goods and services.

1.4 INCOME AND EMPLOYMENT MULTIPLIERS

It is possible to use the I/O techniques to evaluate the income effect due to a change in final demand. The distinctions among direct, indirect and induced income effects may be illustrated by considering the events which take place when demand increases for the output of a particular industry. As the output of this industry rises, its income from all sources increases, giving rise to the direct income of that industry.

FIGURE 2

DIRECT AND INDIRECT INCOME IMPACT OF A HYPOTHETICAL
PLANT IN A "LARGE" AREA
Dollar Amounts in Millions

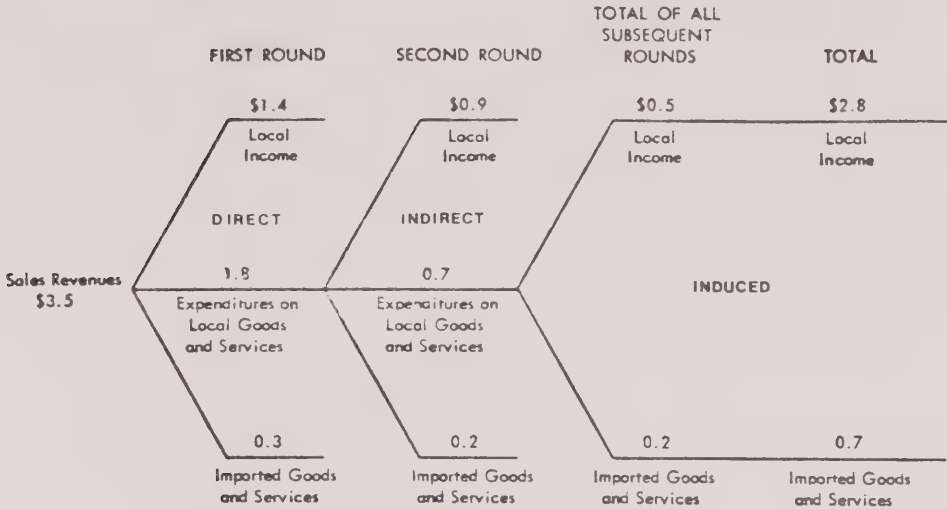
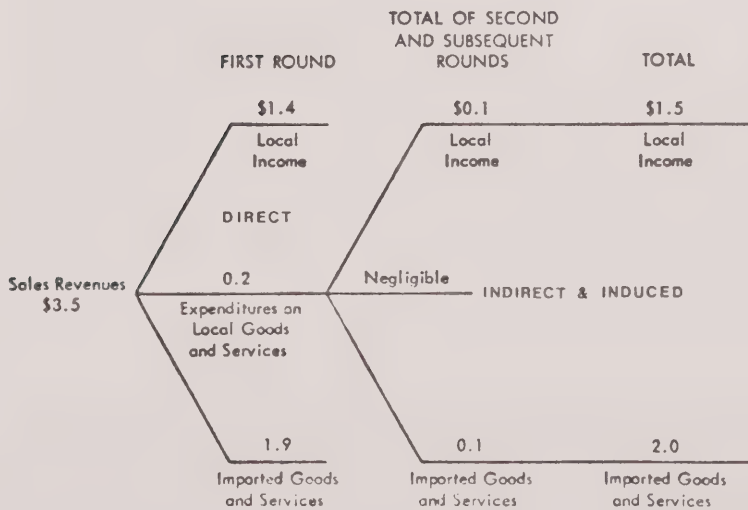


FIGURE 3

DIRECT AND INDIRECT INCOME IMPACT OF A HYPOTHETICAL
PLANT IN A "SMALL" AREA
Dollar Amounts in Millions



Source: "Industrial Location as a Factor in Regional Economic Development", U.S. Department of Commerce, 1968.

But the output of one industry cannot be expanded without increasing the output of other industries and, when the output of these industries is expanded to fill new orders, income is again generated in one or more industries. These are called indirect income effects.

The process is further complicated, by the fact that, as income expands as a consequence of the direct and indirect effects, households will increase their purchases of goods and services, thus giving rise to still further production and income. These are called induced income effects. Fig. 2 & 3 (10)
A complete analogy exists for the employment multipliers.

- 1) the direct income impact (effects): the wage, salary, and other income payments (such as profits and interest)
- 2) the indirect income impact: the wage, salary, and other income payments to those industries and suppliers (sectors) who provide goods and services to the sector in question.
- 3) the induced income impact: the increase in wage, salary, and other income payments of (consumer goods) sectors brought about by consumption spending out of augmented incomes.

TABLE 2

The sectors exhibiting the largest income multipliers in Ontario are: (1)

- | | |
|----------------------------------|--------------------------|
| 1. Plastics and synthetic resins | 6. Other food |
| 2. Meat and poultry | 7. Tobacco |
| 3. Petroleum and coal | 8. Metal shops |
| 4. Dairy products | 9. Electrical appliances |
| 5. Grain mills | 10. Knitting mills |

TABLE 3

The sectors exhibiting the largest employment multipliers are: (1)

- | | |
|------------------------------|------------------------------|
| 1. Petroleum & coal products | 6. Grain mills |
| 2. Plastics | 7. Other food industries |
| 3. Tobacco | 8. Other chemical industries |
| 4. Meat & poultry | 9. Electrical appliances |
| 5. Dairy products | 10. Motor vehicle & aircraft |

Generally, the set of "food industries" exhibits both large income and employment multipliers* while utilities, mining, and primary metals exhibit relatively low multipliers. This finding holds equally for simple multipliers and multipliers with induced effects with only slight changes in ranking.

This picture is altered when the Central Ontario Region multipliers are examined. (See Tables 4 and 5.)

TABLE 4

Largest total income effects for Central Ontario: (5)

- | | |
|-----------------------------------|-----------------------|
| 1. Printing & publishing | 6. Paint & varnish |
| 2. Furniture & fixtures | 7. Metal stamping |
| 3. Biscuits & bakeries | 8. Clay, lime, cement |
| 4. Paper products | 9. Other electrical |
| 5. Fabricated & structural metals | 10. Communications |

* For technical reasons labour is measured not in man-years but in terms of the total wages and salaries as opposed to total income, which includes profits and interest as well.

TABLE 5

The largest wage and salary (employment) effects for Central Ontario are: (5)

- | | |
|---|---------------------------------|
| 1. Printing & publishing | 6. Paint & varnish |
| 2. Furniture & fixtures | 7. Industrial electrical equip. |
| 3. Biscuits & bakeries | 8. Metal stamping |
| 4. Paper products | 9. Communications equipment |
| 5. Miscellaneous manufacturing industries | 10. Other electrical industries |

The differences can be explained by the relative dominance of certain industries in the region which in turn is influenced by the industrial complex of Metro Toronto.

Yet another set of prominent sectors is shown in Tables 6 and 7 for the Lake Ontario Region, which lies to the east of the Central Ontario Region beginning with the area east of Bowmanville.

TABLE 6

Ten largest income effect sectors in Lake Ontario Region: (5)

- | | |
|---------------------------------|-----------------------------|
| 1. Electrical industrial equip. | 6. Rubber products |
| 2. Clay, lime, cement | 7. Other food industries |
| 3. Synthetic textiles | 8. Dairy products |
| 4. Communications equipment | 9. Grain mills |
| 5. Furniture & fixtures | 10. Distilleries, breweries |

TABLE 7

Ten largest wage and salary (employment) effect sectors in Lake Ontario Region: (5)

- | | |
|------------------------------------|---------------------------------------|
| 1. Electrical industries equipment | 6. Furniture & fixtures |
| 2. Communications equipment | 7. Leather and leather products |
| 3. Synthetic textiles | 8. Dairy products |
| 4. Clay, lime, cement | 9. Other metal fabricating industries |
| 5. Rubber products | 10. Mineral products |

2. PROBABLE SECTORS ANALYSIS

Manufacturing plants that are producing for regional or national markets are "export"* industries and are usually generators of economic growth. A region's growth typically has been provided by its ability to produce export goods or services at a competitive advantage with respect to other regions.

The effectiveness of export industries in promoting growth lies in their twofold impact. Not only do such industries provide jobs and income, they also tend to expand. They increase size of local markets, which in turn provide the base for additional manufacturing industries. A cursory examination will reveal rather clearly, however, that the provision of jobs alone is not an adequate objective for regional development. For instance, additional jobs, if they provide incomes below the average of those already existing in the region, might result in a decline in per capita income.** It would seem that the development objective should include, as a minimum, both the growth of the economy and the improvement of the welfare of the people.

In addition to increases in per capita real income, two more objectives are included: improved stability and balance in the economy. By "stability" is meant reasonably steady growth throughout the swings of the business cycle.

* industries with markets extending beyond the local area.

** On these grounds the "low wage/apparel" cluster is disqualified along with knitting mills and other textile related industries.

The concept of economic balance includes two aspects: a balance between the agricultural and other income-based activities, on one hand, and manufacturing and service activities, on the other.

It also includes a diversity in the mix of export industries that can reduce the effects of extreme fluctuations in any particular industry. In addition, location of an industry in a large, diversified area tends to generate the largest direct and indirect income effects. Of these, the indirect income effect on a community tends to become absolutely larger with the increase of the size of the population.⁽¹⁰⁾

2.1 SECTORAL LINKAGES

The interdependence among productive sectors can be studied from several points of view. One of them is examination of direction, intensity and dispersion of economic linkages between productive sectors. These generally fall into two categories: forward linkage and backward linkage.

Forward linkage represents flow of goods and services from industry j to other industries, and for final demand. These goods and services are outputs.

Backward linkage represents flow of goods and services into industry j, i.e. its inputs. (See Fig. 1)

2.2 High forward linkage for a sector means that the outputs of that sector will have to increase more than others for an increase in the final demand of the whole sector. In this category is found all primary manufacturing sectors, e.g. synthetic textiles, pulp and paper mills, paper products, printing & publishing iron and steel mills, etc.

The sectors with low forward linkage are the final and intermediate manufacturing sectors; e.g. electrical appliances, pharmaceuticals, biscuits and bakeries, etc.

2.3 High backward linkage means that a sector absorbs more than the average of the whole systems of outputs of other sectors. In this category is found final and intermediate manufacture e.g. the "food industries", paper products, plastics and synthetic resins, miscellaneous manufacturing, electrical appliances and other electrical products, etc. and also both final and intermediate primary production - e.g. the "textile" industries, construction, maintenance and repairs, etc.

Low backward linkage is characteristic for clothing industries, furniture and fixtures, printing and publishing, transportation, storage and trade, construction, maintenance and repair, etc.

2.4 In conjunction with the classification of sectors by their forward and backward linkages another identifier is used - the coefficient of variation index.

In simple terms it means the variable degree of dispersion of the sectors in regard to inputs and outputs of the sector j. For example, any given sector j can draw its inputs heavily from one or few sectors, (high coefficient) or it can draw evenly from a multitude of sectors (low coefficient).

Analogously, sector j's output can be inputs to one or a few other sectors, or it could supply inputs to a great number of other sectors.

2.5 KEY SECTORS

A key sector is defined as one with high forward and backward linkages. There are presently four that classify under this criterion* in Ontario:⁽¹⁾

- Synthetic textiles
- Paper products
- Other chemical industries
- Transportation, storage and trade

It should be noted that the sector called Transportation, storage and trade here is actually value added or mark-up by these services.⁽¹⁶⁾ Six others rank as potential key sectors (with one of the four conditions slightly violated):

- Other metal fabricating industries
- Other food industries
- Other primary metals
- Plastics and synthetic resins
- Dairy products
- Miscellaneous manufacturing industries

2.6 IMPLICATIONS:

Sectors with high forward linkages supply more than average outputs of intermediate products and final consumption goods. Thus having these sectors on site would make the region an important supplier of finished goods and services.

High backward linkage means that these industries are sought after by the primary producers and the low coefficient guaran-

* The four conditions under this criterion are: high forward linkage and low coefficient of dispersion, and high backward linkage and low coefficient of dispersions.

tees an even draw on many suppliers, thus stabilizing the economy.

2.7 ECONOMIC IMPACT

The economic impact of a new industry (or a set of industries, if started simultaneously) may be measured in terms of the total income generated in the geographic area of such an industry. Three time periods must be distinguished:

1. The Construction Phase

Income is generated by the construction of facilities to house the new industries and, in the case of North Pickering, to provide homes for employees of the new industries at approximately the same time.

2. The Short-Run Phase

An increase in total income and employment results rather quickly from the expansion in the region. However, the general pace of change in the basic structure of the regional economy will depend largely on the pace at which new industries are locating in the area. This phase takes place immediately after the construction phase and, as North Pickering is expected to grow over the period of time, it will be taking place over the entire period, at different times for different industries.

3. The Long-Run Dynamic Phase

The basic structure of the regional economy may change in response to the stimuli provided by new industries. Additional industries may be established to provide goods and

services previously imported. Others may be established to make use of new labour pools that arise because of the expanded activities of the original industries and their suppliers.

It is obvious then that the rate of growth of the region depends largely on the original industries or, even more appropriately, on the "mix" of industries meeting the criteria of growth, stability and welfare of population.

Since a large percentage of capital in Ontario manufacturing is foreign-owned⁽¹⁸⁾ and, consequently, repatriates substantial income to non-residents of Ontario, and given our interest in the capacity of industries to generate employment in the region, the initial criterion for identifying the industries for NP is the ability of an industry to generate substantial wage and salary income (as described by the wage and salary income multipliers* (ranking in column 9 of table A1.)⁽⁵⁾

This ranking differs very little from the overall income multiplier ranking presented in column 8, but it indicates which industries generate the largest income for Ontario residents, inasmuch as they generate the largest incomes from all sources, part of which will probably go abroad.

The distinction between column 8 and 9 is that the wage income in column 9 is more likely to be spent in the region where it is earned, whereas income from other sources is more often paid and spent outside the region where it is earned.

* The multiple amount by which provincial income will increase in response to the initial increase in demand. Income in central Ontario is increased most by expansion in printing and publishing.

3. THE CLUSTER THEORY

One of the side benefits of the I/O method is the relative ease with which it is possible to determine the degree of correlation among the industries, and thus to group them into several mutually exclusive clusters.

A cluster is a group of economic activities that have similar locational patterns. They may or may not be functionally related.

3.1 Strong correlation was found among the members of the following groups:⁽⁶⁾

Cluster 1: Electronic components manufacture
Sub-cluster: shoes and textiles

Cluster 2: Hotels and recreation services. Associated with this cluster may be:
Sub-cluster 1: retail trade, personal services and air transportation and, in the presence of rapid population growth,
Sub-cluster 2: construction, concrete and real estate.

Cluster 3: metalworking and machine building industries, composed of screw machinery products (nuts and bolts), cutlery, metalworking machinery, general industrial machinery, industrial leather belting, mechanical measuring instruments, metal cans, special industrial machinery.

This is a close approximation of a metal working complex which is often mentioned as a possible industrial base for growth cluster. Many of the specialized services that the other machine building industries require--the making of jigs, moulds and dies, and rebuilding of machine tools--are included in the metalworking machinery industry.

Other services, however, such as machine shops and electroplating are industries that show very little association with this cluster.

Cluster 4: an association was found among three members of the electrical goods industry:

electric test and distributing equipment, communication equipment and electronic components.

Specialization in these industries shows less correlation with office machines and computers, and very little correlation with specialization in other electrical products such as radio and TV receivers.

3.2 HIGHER LEVELS OF AGGREGATION:

On a higher level, the following super-clusters can be identified:

1. metal products, machinery and equipment, and precision instruments;
2. market cluster group

The market cluster group requires a further breakdown. There are essentially two types of market centre activities:

a) market centre business services, b) market centre consumer services.

Market Centre Business Services:

commercial printing

communications (telephone company, radio-TV broadcasting)

banking

security and commodity brokers and exchanges

insurance carriers

advertising

miscellaneous business services (employment agencies, testing laboratories, management consultants)

legal services

miscellaneous services (data processing, non-profit research)

Market Centre Consumer Services:

Construction

bakery products

newspapers

paints and varnish

local and inter-urban transit

retail trade

non-bank credit agencies

insurance brokers, agents and service

real estate

combined real estate, insurance, loan, law offices

personal services (laundries, barber shops, funeral parlors)

automobile repairs and rental)

motion pictures (production and theatres)

medical services (physicians, dentists, hospitals)

education services (schools, colleges, libraries)

non-classifiable establishments

3.3 CLUSTERS AND WAGES

Wages in the industries composing the metalworking cluster average above the mean for manufacturing as a whole.

If the metal working/machine building cluster is an example of how a favourable industry mix can raise local wages, a "low wage/apparel" cluster shows the opposite kind of orientation. These activities have wages below the national average for all manufacturing and are characterized by low skill and high labour input.⁽¹⁴⁾

4. SUMMARY AND CONCLUSION

In the course of this paper, an attempt was made to throw some additional light on the possible industries for North Pickering.

As North Pickering lies in the Region of Durham, which is relatively short of a good mix of industry, establishment of new industries in North Pickering will have a dramatic effect on the economy of the region.

The location of North Pickering for the purpose of industry is a fortunate one. The region has demand for industry, and has a large commuter population.⁽¹⁷⁾

Second largest positive factor is the proximity of North Pickering to the large and established centre of trade, commerce and education, Metro Toronto.

Another positive factor is the proximity of the metalurgical complex of Hamilton. The North Pickering site lies within a 60 mile radius of the steel mills, which means the primary metal products needed for metal working industry will be relatively close, especially in view of the existing rail connections and proposed highway #407.

The above three factors indicate clearly that the metal working-machine building complex is a viable alternative for North Pickering. See Figure 4.

Upon examining table A1, columns 1 and 2, we can readily see the major components of this complex--metal fabricating, miscellaneous machinery and even metal stamping, coating, etc.

are "export" industries, i.e. with their markets extending beyond the local area.

4.1 The metal working and machinery industries do not score very highly on the Central Ontario income and employment ratings, but this is because these industries traditionally located west of Metro, outside of the Central Ontario planning area. The metal working and machinery building complex has around the average income and employment multipliers, and about average total output effects.

4.2 Even better indicators are obtained for the electrical-electronics cluster. This cluster deals with a wide range of industries which are producing either to satisfy final demand--e.g. appliances, communications equipment, radio and T.V. receivers--or their products are inputs into other industries such as motors for transportation equipment, electric transmission and regulating gear, measuring devices, etc.

This group is characterized by a strong export position above average income and employment multipliers and generally fairly strong linkages. (Figure 5)

4.3 The usefulness of "food" industries does not have to be questioned. These industries--meat and poultry, dairy products, grain mills, bakeries and other food-related industries--exhibit large income and employment multipliers and strong sectoral linkages.

DOMINANT LINKAGES

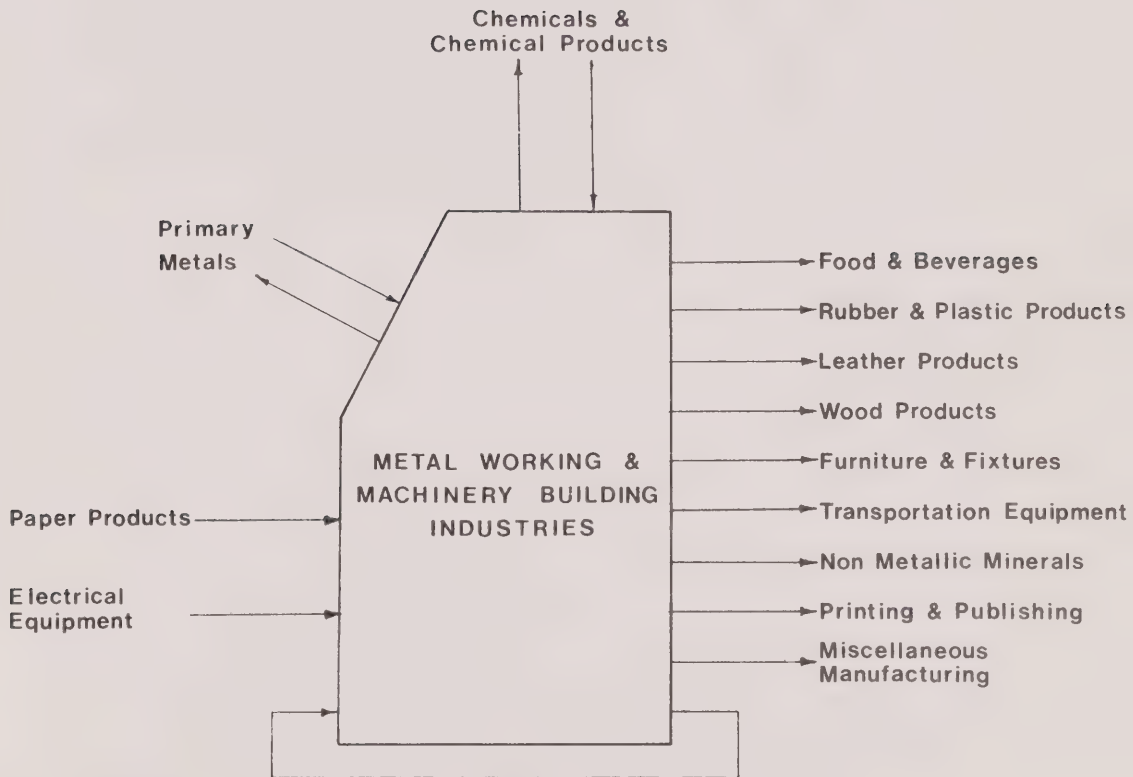


FIG. 4

DOMINANT LINKAGES

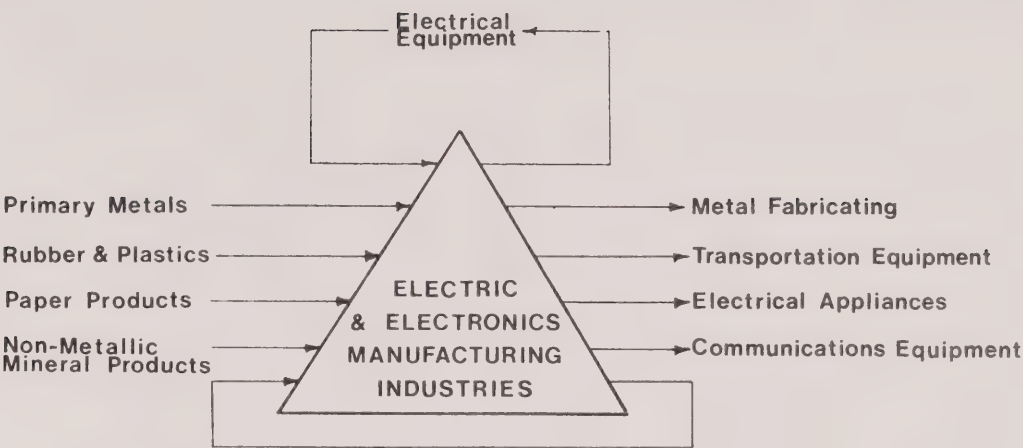


FIG. 5

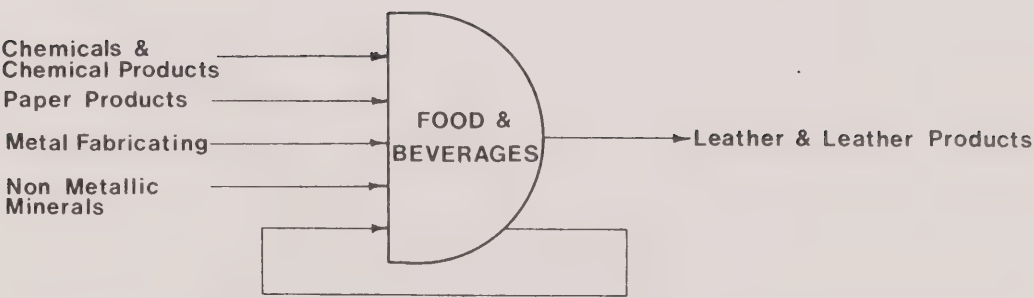


FIG. 6

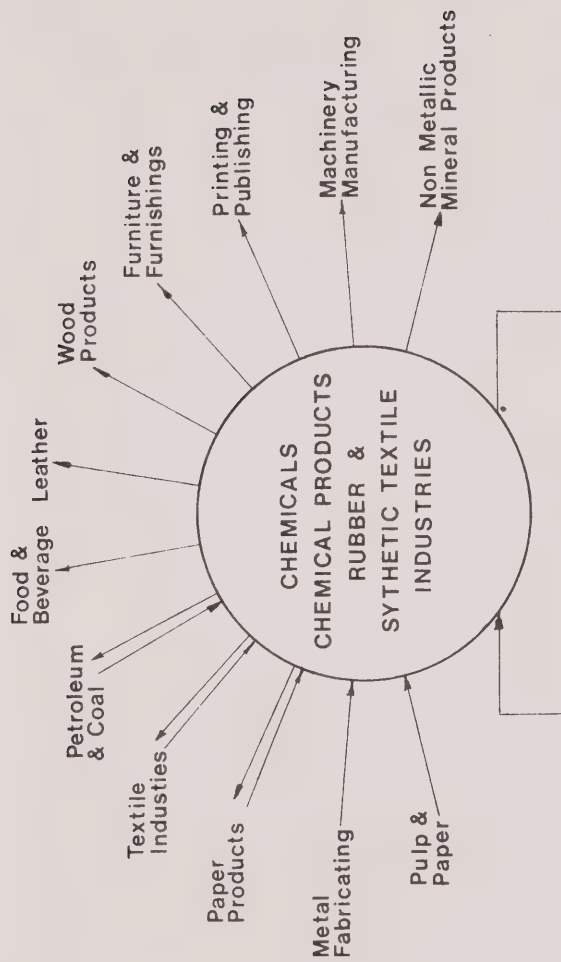


FIG. 7

DOMINANT LINKAGES

4.4 Chemical and chemical products industries, here lumped together with plastics and synthetic resin, pharmaceuticals, paint and varnish, rubber and rubber products exhibit some of the best characteristics for any industry. (See Figure 7)

This group has above average strong sectoral linkages and several of the industries comprising this group are key or potentially key industries in Ontario.

Well above average income and employment multipliers places it near, if not at the top of all rated groups.

4.5 The last group examined here is the furniture and furnishings and paper products. Paper products are a key sector in Ontario which also scores highly on the income and employment multipliers rating. Both furniture and paper products are export industries.

4.6 Printing and publishing, tobacco and tobacco products, and miscellaneous manufacturing industries all have some of the desirable characteristics under the original criteria of growth, economic stability and general welfare. Miscellaneous manufacturing is discussed in greater detail because this heterogeneous group offers the greatest choice in possible manufacturing activities and thus a great range of possible initial industries as well as some indications of possible "filler" industries for North Pickering.

5. Table A1. SUMMARY OF INDICATORS FOR PROBABLE INITIAL INDUSTRIES FOR NORTH PICKERING

INDUSTRY	TYPE	ONTARIO MULTIPLIER				AGGREGATE RATING	VALUE ADDED (\$)	TOTAL OUTPUT EFFECT RATING	MULTIPLIERS				RATING	
		(\$)		EMPLOYMENT	CENTRAL ONTARIO INCOME				EMPLOYMENT	LAKE ONTARIO INCOME	EMPLOYMENT			
		E/I	2											
												3	4	
Metal stamping, etc.	E+			7.6	6.2	5	6	7	8	9	10	11		
Other metal fabricating	PK,D E-			5.8	4.3	5	35/20	20	7	8	36	36		
Miscellaneous machinery	D,G E+			4.8	4.5	4	39/26	24	23	20	11	9		
						4	47/24	42	19	28	34	31		
Electrical appliances	G E+			7.6	5.9	5	34/22	21	12	13	22	12		
Electr.industrial equ.	G E+			6.1	4.7	3	45/29	34	11	7	1	1		
Communications equip.	E+ E+			5.9	4.5	4	40/26	25	10	9	4	2		
Other electr. industries	E+ E+			5.9	4.4	4	34/22	16	9	10	21	13		
Meat and poultry	I+ E+			15.7	9.5	8	14/10	2	32	25	23	27		
Dairy products	PK,D E+			14.6	8.9	7	19/14	4	31	23	8	8		
Grain mills	I+ E+			9.5	8.3	7	19/10	5	38	36	9	21		
Biscuits & bakeries	D E-			6.4	4.3	4	40/29	17	3	3	28	29		
Other food industries	PK E-			8.4	7.8	8	23/11	3	33	33	7	26		
Plastics & synt.resins	PK E-			21.1	19.0	7	09/05	1	29	32	13	16		
Paints & varnish	E- E-			6.0	4.9	4	32/19	11	6	6	39	37		
Pharmaceuticals	E- E-			4.7	3.7	4	37/24	33	17	15	43	43		
Other chemical indus.	K E+			6.1	6.4	9	36/16	14	25	27	32	34		
Rubber products	G E+			5.8	5.0	5	41/23	13	21	19	6	5		
Synthetic textiles	K,G I+			4.4	4.3	6	38/18	20	40	40	3	3		
Misc. manufacturing	D,G E-			5.8	3.9	5	37/28	12	13	5	24	14		
Printing & publishing	D E-			5.0	3.5	2	55/39	43	1	1	26	23		
Tobacco & tobacco prod.	E+ E+			10.4	13.8	6	26/08	10	24	31	40	41		
Furniture & fixtures	E- E-			6.2	4.2	2	42/31	27	2	2	5	6		
Paper products	K E-			7.3	5.2	8	33/22	16	4	4	20	19		
Construction, maint.														
Repairs	E-			6.1	4.2	4	46/35	35	35	34	30	30		
Transp, Storage, Trade	K I+			2.8	2.2	3	68/42	36	48	46	48	48		
Utilities	I- I+			3.0	4.5	3	66/18	47	49	49	49	49		
Communications	I+ I+			3.5	4.8	3	74/23	23	44	42	45	46		

Note: See following page for explanation of terms and abbreviations.

5.1 EXPLANATION OF THE TABLE

Column 1: PK: potentially key sector in Ontario

K: key sector in Ontario

G: growing-industry, has shown increase in terms of \$ value of outputs, or rise in employment and/or productivity in period 1965-1971. (15)

D: dispersed-on this level of aggregation, industry shows no locational preference (15)

Column 2: E+: above average export position

E-: below " " "

I+: above " import position

I-: below " " " (1)

Columns 3, 4: absolute values for Ontario Income and Employment multipliers. For example, if the output of "metal stamping" were to increase by \$1.00, the total, i.e. direct plus indirect plus indirect income from all sources in Ontario would increase by \$7.60.

It should be noted that the employment multiplier is expressed in terms of wages and salaries (i.e. dollars) rather than man-years or man-days. This is due to the technical difficulty of properly assessing each industry's effective labour productivity.

Column 5: The values for the aggregate rating were derived as follows: each industry was rated on scale 0-10, scoring 1 point for an above average standing in exports, direct output effect, indirect output effect, induced output effect, simple (no induced effects) income multiplier, single employment multiplier,

backward linkage, forward linkage, backward and forward linkages coefficient of variations, and a below average position in imports. A higher figure indicates a better standing.

Column 6: value added in terms of 1965 cents. The two figures represent the total value added, and its wage-salary component.

Column 7: total (direct plus indirect plus induced) output effects rating on scale 1-49. This column as well as columns 8-11 inclusive are ordinal ratings, i.e. a lower figure indicates a better standing. This column can be interpreted as representating relative importance of different sectors in Ontario's economy as a whole.

Columns 8, 9, 10, 11: These two pairs of columns indicate each industry's relative standing in income and employment multipliers. The Central Ontario pair represents the area around North Pickering, including Metro Toronto, Pickering, Ajax, Whitby, Oshawa and Bowmanville. The second pair of columns represents the area east of Bowmanville, and was included to indicate the different relative weight of the same industries in that area. The reason for including these figures follows from the fact that North Pickering lies in the eastern fringe of the Central Ontario, and may have strong ties with both the areas to the west and to the east.

Case No. 1: Miscellaneous Manufacturing Industries

Under this heading is found the following sub-categories and groups:

Scientific and Professional Equipment Industries

Jewellery and Silverware Industry

Sporting Goods and Toy Industries

Signs and Displays Industry

and others, as diversified as:

Art goods

Hair dryers

Linoleum

Magnetic film and tape

Musical instruments

Pen and Pencil Manuf.

Records and Recording and duplication on records, tapes

Typewriter supplies

Umbrellas, etc.

Characteristics:

This sector is rated as a potential key sector in economy of Ontario.

It's a dispersed sector, i.e. "footloose", readily able to relocate in a new place.

By the total output effects it ranks 12th among 48 sectors.

By the magnitude of the Central Ontario overall income multiplier it ranks 13th among 48 sectors.

By the magnitude of the central Ontario wage and salary multiplier it ranks 5th among 48 sectors.

In addition, it scores above average (5) on the overall rating of linkages, multipliers and export-input position.

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